SCIENTIFIC SERIAL LISTS

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This article describes the need for user-oriented serial lists and the development of such a list in the California Institute of Technology library. The results of conversion from EAM to EDP equipment and subsequent utilization of COM (Computer-Output-Microfilm) is reported.

INTRODUCTION

Prior to the dedication of the Millikan Memorial Library, which houses the divisional collections in chemistry, biology, mathematics, physics, engineering, and humanities, the libraries at the California Institute of Technology were largely autonomous, reflecting the immediate needs of each division, and exhibited little attempt at interdivisional coordination of library purchases. With centralization of the major science collections, it became apparent that any efforts to reduce duplication, promote more effective library usage, and provide assistance in interdisciplinary research efforts would require a published list of serials and journals (1).

SCIENTISTS VS LIBRARIANS

It is certainly a truism that serial publications constitute the backbone of a library's research collection. Particularly in the sciences, where serial publications serve as the primary record of past accomplishments, studies have shown that over 80 percent of the references cited in basic source journals are to serials (see Table 1). Citation of serials rather than monographs was greater in chemistry than in other sciences and the overall order may reflect the efficiency of the respective abstracting/indexing services.

In spite of the scientist's heavy dependence on serials, it appears that in most libraries little attempt has been made to reconcile the library

*Table 1. Percentage of citations to serials found in basic source journals for various, scientific disciplines**

Discipline	Percentage of citations to serials
Chemistry	93.6
Physiology	90.8
Physics	88.8
Entomology	81.2
Zoology	80.8
Mathematics	76.8

*C. H. Brown, *Scientific Serials* (Chicago: Association of College and Research Libraries, 1956).

record with practices found in the scientific literature. This is in part due to the general acceptance of the Library of Congress dictum that serials should be cataloged according to the general principles laid down for monographs. Fortunately, monographs are generally cited in the scientific literature by entries (author/title) which invariably appear in the library catalog. Serials, however, present the special problems of so-called indistinctive titles, frequent title changes, and common reference to the abbreviated form of their title.

Most American libraries have followed the Library of Congress/Union List practices and as a result have long suffered user complaints about the use of corporate entries for so-called indistinctive titles, entries under the latest form of title, and the treatment of prepositions and conjunctions as filing elements. These practices have been defended as attempts to extend the reference value of the catalog but in doing so they create a number of problems and ambiguities which are only partially resolved by the annoying use of see references. The recent surge of interest in making the library "relevant" and more intimately involved with its users needs must take into account that in the minds of scientists it is a presumptive requirement for them to remember cataloging rules when the library could just as well accommodate the scientific form.

In recognition of the long-standing scientific tradition of describing serials by their titles (which considerably predates the corporate entry syndrome), the logical solution would be to provide title added entries for those serials whose main entry is in corporate form (2).

SPECIFIC PROBLEMS

1. Even if scientists were to remember the basic rules for society publications and similar corporate entries, how are the exceptions shown in Table 2 to be reconciled?

2. The practice of cataloging serials under their latest title then best serves as an obstruction to determining the library holdings, since refer-

Table 2. An example of the difficulties encountered in translating abbreviations of scientific journal titles into LC entries

Abbreviation	Scientific form of title	Union List entry
Bull Acad Pol Sci	Bulletin de l' Academie . . .	Polska Akademia Nauk
PNAS	Proceedings of the National . . .	National Academy . . .
JACS	Journal of the American . . .	American Chemical . . .
Berichte	Berichte der Deutschen . . .	Deutsche Chemischen . . .
Comp. Rend.	Comptes Rendus . . .	Academie des Sciences . . .
Ber. Bunsen . . .	Berichte der Bunsen . . .	Deutsche Bunsen . . .
Bull. Soc. Chim. Belges	Bulletin des Societies . . .	Bulletin des Societies . . .
Bull. Soc. Chim. France	Bulletin de la Societe	Societe Chimique des France

ences given in the scientific literature and citations obtained from abstracting/indexing services are obviously to the title currently in use. Another important factor, that is sometimes overlooked, is the requirement of a classified shelf arrangement. Otherwise, since the title of the bound volume corresponds to the title in use at the time of binding, you have the ambiguity of catalog referring to the latest title and shelf locator referring back to the earlier title. These problems are further complicated by the long delays and backlogs in recataloging. In many large libraries this is a major function of serials catalogers and it is estimated that it takes 50 percent longer to recatalog than to catalog originally (3).

3. The jargon of scientists when discussing or requesting information about various periodicals is replete with acronyms and abbreviated forms. *JACS, PNAS, Berichte, Comptes Rendus, Annalen* all have well-defined meanings in scientific literature and conversation because of the well-developed title entries and abbreviations given in *Physics Abstracts, Chemical Abstracts,* and the *World List of Scientific Periodicals.* The use of prepositions and conjunctions as filing elements constrains these scientists to being able to translate these abbreviations only into title entries where the omitted words are obvious, e.g., *Journal of the American Chemical Society* but often causes problems with titles like *Journal of the Less-Common Metals.*

THE CAL TECH SERIALS LIST: OBJECTIVES AND PROCEDURES

The publication of a serials list oriented to the needs of scientists must then provide for: scientific title entries for corporate and society publica-

tions, treatment of each title change as the cessation of the old title, and omitting prepositions and conjunctions as filing elements. These practices will increase the number of entries by about 40 percent over the number of current titles but in terms of user appreciation the extra expense is amply justified. The list can then be a logical extension of the library's reference service and offers the opportunity of facilitating the research efforts of its users by obviating the need to remember cataloging rules or visit the library to determine its holdings.

Input to the serials list was derived from the library's serials card catalog. The information was typed on oversize card stock and included the full main entry, holdings, and divisional library location, with additional data cards, as required, to reflect title changes. With this data base, an extensive search of the *World List of Scientific Periodicals* and *List of Periodicals Abstracted by Chemical Abstracts* was made to determine the additional scientific title entries to be incorporated in the list. (Each departmental library provides a shelf locator which relates the various forms of entry in the serials list to that chosen for the bindery title and subsequent shelf location.)

Prepositions and conjunctions were replaced with ellipses in the final typing of multilith stencils required for the manual publication of the first edition of the *Cal Tech Serials List* (4).

During the spring of 1969, the decision was made to employ EDP techniques in the publication of the second edition of the list. As an interim housekeeping device between editions, the author maintained an in-house supplement on punch cards using a single card format. This experience indicated an unacceptable severity of title abbreviation which was obviated by adopting a two-card format. This is consistent with the IBM 360 system wherein input records are read two cards at a time, and thus, the unit record may be thought of as a "super" card of 160 columns (of which only a maximum of 131 columns can be printed on a given line, the remaining 29 columns being used for internal records).

The unit serials record consists of the title, holdings, divisional library, serial number, and spacing command (see Table 3). The unit records were created directly from the existing serial list and the cumulated supplement by in-house clericals. This obviated the usual requirement of coding the data for keypunch operators.

Subsequent to the preparation of the unit records, having an alphabetical sequence of punched cards, it was a simple matter to program the computer to serially number each second card, using one letter and six digits. An example of the distribution of titles one might expect is given in Table 4.

While the data conversion was being performed, a series of programs was written. These programs were designed to create a master tape, update the tape, and to produce a variety of listings. These listings, in addition to the required 131-column printout for the serial list, include the 160-column

Table 3. The unit serials record

Card No.	Columns	Field Designation
1	1–75	Title
2	1–27	Holdings
2	29–32	Divisional library
2	72–78	Serial No.
2	80	Spacing command

Table 4. Distribution of titles by initial letter.

Letter	Number of Title Entries
A	1,024
B–D	1,126
E–I	1,199
J–M	1,272
N–R	1,413
S–Z	1,471

printout (in sequential 80-column units) and printouts for individual divisional libraries which can be annotated with shelf locations.

The data base was then transferred from punch cards to magnetic tape and subsequent additions and changes involve punch cards and tape one onto tape two operations. As a protective device tape one and tape two are the current and previously current tapes, respectively. Thus in the case of accident the preceding tape can again be updated. As a further precaution the original punch card data base and update decks are on file.

The economic justification for the use of EDP equipment in libraries is based upon the necessity of maintaining current records that can be published at regular intervals. In the special case of serial lists this involves the periodic merging of small numbers of new and corrected unit records with the much larger number of unit records in the existing data base. The use of serially numbered unit records allows the relatively easy machine function of merging numbered items in contrast with the difficulties involved in merging large alphabetical fields.

Recent advances in reprographic technology suggested that COM (Computer-Output-Microfilm) could be utilized to produce a quality catalog, free of the normal objections to "computer printout." The flexibility of currently available COM units allows the acceptance, as input of a normal print tape from most computer systems (IBM, Burroughs, Univac)

Table 5. Data presentation and relative spacing

Title	Holdings	Divisional Library
Faraday Society, London		
Discussions	1,1947+	Chem
	10,1951+	C Eng
Symposia	1,1968+	Chem
	1,1968+	C Eng
Transactions	1,1905+	Chem
	46,1950+	C Eng
Farber-Zeitung	1889–1918	Chem

without reformating (6). The print processors resident in the front-end computer of the FR-80, for example, allow for upper- and lowercase, gold characters, column format, pagination, and sixty-four-character sizes. Variation in character size allows a maximum density of 170 characters per line and 120 lines per (8½ x 11) page.

The application of COM equipment requires the production of a "print tape." This is simply a coded version of the current tape which contains the additional instructions necessary for spacing the unit records, defining the page size, and inserting "continued on next page" statements. The use of spacing command instruction, as an integral part of the unit record, allows all the information on a given title to remain in one unit and easily provides for a blank line before the next title (see Table 5).

The additional problem of keeping the information on one title together on a given page or providing a "continued on next page" statement was solved by analyzing the information in the eighty-ninth line of each page to determine whether to print another line, insert the "continued on next page" instruction, or begin the title on the next page. Once the film is generated, it is a simple matter to produce plates for the multilith production of hard copy (7).

The choice of a ninety-lines-per-page format was influenced, in part, by our desire to use the serials list to break down the reluctance shown by faculty and students toward microformats. This format results in a one-third reduction of the 112-column computer printout and enables our 5,000 current titles to be accommodated on two microfiches (152/pages).

FOOTNOTES

1. For the purposes of this article, periodical and serial are synonymous and refer to publications which may be suspended or cease but never conclude. The term "serials list" should be restricted to publications which record only serial titles (and supplementary information to distinguish between similar titles), holdings, and internal records. Library catalogs and union lists are quite sufficient sources for relating a title

to its successor or precedent, and providing full bibliographic detail.

2. P. A. Richmond and M. K. Gill, "Accomodation of Nonstandard Entries in a Serials List Made by Computer," *Journal of the American Society for Information Science* 11:240 (1970); Dana L. Roth, "Letters to the Editor; Comments on the 'Accomodation of Nonstandard Entries . . .,'" *Journal of the American Society for Information Science* (in press).
3. Andrew D. Osborn, *Serial Publications* (Chicago: American Library Association, 1955).
4. E. R. Moser, *Serials and Journals in the C.I.T. Libraries* (Pasadena: California Institute of Technology, 1967).
5. Dana L. Roth, *Serials and Journals in the C.I.T. Libraries* (2nd ed.; Pasadena: California Institute of Technology, 1970).
6. Robert F. Gildenberg, "Technology Profile; Computer Output Microfilm," *Modern Data* 3:78 (1970).
7. Computer Micrographics, Inc., Los Angeles, California.